

5. Assessment of the Deepwater Flatfish Stock Complex in the Gulf of Alaska

By

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[NOTE: The GOA groundfish Plan Team evaluated catches and noted that they were minor differences so continued to use the projections from 2019 for the 2021, and 2022 specifications (as shown below). An updated partial assessment will be conducted in 2021, and a full assessment in 2023.]

Summary of Results

The key results from the accepted 2019 assessment are shown in the table below with 2021 specifications rolled over to 2022. The results for Dover sole are based on the author's base case model and Tier 3a management. A risk matrix approach was used to evaluate whether the ABC should be set at a lower value than the *maxABC* (see "Harvest Recommendations" section). The risk matrix levels are 1 for all categories except for "Assessment-related considerations," where a risk level of 2 was assigned. Based on these risk levels, the ABC was set equal to the *maxABC*.

Species	Quantity	As estimated or <i>specified last year</i> for:		As estimated or <i>recommended this year</i> for:	
		2020	2021	2021*	2022*
Dover sole	<i>M</i> (natural mortality rate)	0.113(f), 0.119(m)	0.113(f), 0.119(m)	0.113(f), 0.119(m)	0.113(f), 0.119(m)
	Tier	3a	3a	3a	3a
	Projected total (3+) biomass (t)	86,827	84,771	84,771	
	Projected Female spawning biomass (t)	27,935	27,011	27,011	
	<i>B</i> _{100%}	19,032	19,032	19,032	19,032
	<i>B</i> _{40%}	7,613	7,613	7,613	7,613
	<i>B</i> _{35%}	6,661	6,661	6,661	6,661
	<i>F</i> _{OFL}	0.11	0.11	0.11	0.11

	$maxF_{ABC}$	0.09	0.09	0.09	0.09
	F_{ABC}	0.09	0.09	0.09	0.09
	OFL (t)	6,919	6,796	6,796	6,796
	maxABC (t)	5,847	5,743	5,743	5,743
	ABC (t)	5,847	5,743	5,743	5,743
Greenland turbot	Tier	6	6	6	6
	OFL (t)	238	238	238	238
	maxABC (t)	179	179	179	179
	ABC (t)	179	179	179	179
Deepsea sole	Tier	6	6	6	6
	OFL (t)	6	6	6	6
	maxABC (t)	4	4	4	4
	ABC (t)	4	4	4	4
Deepwater Flatfish Complex	OFL (t)	7,163	7,040	7,040	7,040
	maxABC (t)	6,030	5,926	5,926	5,926
	ABC (t)	6,030	5,926	5,926	5,926
	Status	As determined <i>this</i> year for:			
		2019	2020	2021	2022
	Overfishing	no	n/a	no	no
	Overfished	n/a	no	n/a	n/a
	Approaching overfished	n/a	no	n/a	n/a

*Projections are based on estimated catches of 109 t and 258 t used in place of maximum permissible ABC for 2019 and 2020-2021, respectively. The 2019 projected catch was calculated as the current catch as of October 19, 2019 added to the average October 19 – December 31 catches over the 5 previous years. The 2020-2021 projected catch was calculated as the average catch from 2014-2018.

Area apportionment for ABC of deepwater flatfish is currently based on the proportion of survey biomass of Greenland Turbot and deepsea sole found within each management area from 2001-2019 and estimates of 2020 and 2021 survey biomass for Dover sole in each management area based on results from the random effects model. An ABC exists only at the level of the complex (deepwater flatfish) and not for each species individually. The ABC by area for the deepwater flatfish complex is then the sum of the species-specific portions of the ABC.

The random effects model is used to fill in depth and area gaps in the Dover sole survey biomass by area and to calculate an area- and depth-specific projection of 2020 and 2021 survey biomass. These estimates are summed over depths and the resulting relative biomass in each management area is used as the basis for apportionment of the Dover sole portion of the deepwater complex. This method of conducting area apportionment for deepwater flatfish was recommended by the GOA Plan Team in 2016 (McGilliard 2016). The method was chosen because it accounts for time and area gaps in the survey for Dover sole, which comprises nearly all of the deepwater flatfish catch and Dover sole moves to deeper waters ontogenetically, and explicitly accounts for differences in the spatial distributions of Dover sole and Greenland turbot. Greenland turbot were found exclusively in the Western GOA region by the survey over the period 2001-2019.

Species	Year	Western	Central	West Yakutat	Southeast	Total
		0.8%	33.3%	36.0%	29.9%	100.0%
Dover Sole	2021	46	1,911	2,067	1,719	5,743
	2022	46	1,911	2,067	1,719	5,743
		100.0%	0.0%	0.0%	0.0%	100.0%
Greenland Turbot	2021	179	0	0	0	179
	2022	179	0	0	0	179
		0.7%	72.8%	14.5%	12.0%	100.0%
Deepsea Sole	2021	0	3	1	0	4
	2022	0	3	1	0	4
Deepwater Flatfish	2021	225	1,914	2,068	1,719	5,926
	2022	225	1,914	2,068	1,719	5,926